REMARKS

Claims 1-14 stand rejected under 35 U.S.C. § 112, second paragraph, for allegedly being indefinite. In response to this rejection, each instance of the phrase "normal plasma" in claims 1-3, 9, 10, and 14 has either been deleted or amended to eliminate the word "normal". It is believed that these amendments overcome the rejection of claims 1-14 under 35 U.S.C. § 112, second paragraph, in the Office Action.

Claims 1-14 stand rejected under 35 U.S.C. § 103(a) for obviousness from the various teachings of U.S. Patent No. 5,383,019 to Farrell et al.; U.S. Patent Application Publication No. 2002/0071117 to Ukon et al.; U.S. Patent No. 5,642,190 to Krupa et al.; U.S. Patent No. 3,692,415 to Shiller; U.S. Patent No. 6,526,355 to Ni et al.; and U.S. Patent Application Publication No. 2003/0192864 to Tanaka et al.

Herein, claims 1, 2, 3, 9, 10, and 14 have been amended and new claim 15 has been added. After the foregoing amendments, claims 1-15 are pending in the application.

Amended claim 1 is directed to a spectrometer that comprises a detector for monitoring a plasma, and a control section for receiving a signal from the detector and for determining from said signal that the plasma has collapsed into the toroidal plasma. The control section is configured to shut down the torch when the control section determines that the plasma has collapsed into the toroidal plasma.

Amended claim 14 is directed to a method of controlling a plasma torch spectrometer comprising producing a plasma in a tube of a spectrometer, a detector detecting a collapse of the plasma into a toroidal plasma, receiving a signal from the detector at a control section, determining with the control section that said plasma has collapsed into the toroidal plasma, and said control section responding to determining that said plasma has collapsed into the toroidal plasma by shutting down said torch.

In the detailed rejection of claims 1-4, 6, 9, and 14 under 35 U.S.C. § 103(a) in the Office Action, the Examiner admits that the Farrell et al. patent "does not explicitly show that the detector is for detecting a change in the plasma from a normal plasma to a toroidal plasma created in a tube of the spectrometer." However, the Examiner argues that the Ukon et al. publication "shows that it is known to provide a plasma spectrometer with an optical detector for

detecting the plasma status including plasma shape which is analyzed by the light generated by the plasma, and Ukon teaches that the plasma status dictates or influences the analytical performances of the plasma torch. Ukon further shows a computer along with a video camera for monitoring the plasma status, including the plasma intensity, image and position."

In the Response to Arguments section on page 5 of the Office Action, the Examiner argues that paragraph [0022] of the Ukon et al. publication discloses monitoring changes in the plasma status including its shape, position, and light intensity. The Examiner then concludes that it would have been obvious to adapt the teachings of the Farrell et al. patent in view of the Ukon et al. publication "to further control the operating conditions including from a normal plasma to any other shapes, including a toroidal shape, to meet a desired torch conditions." Reconsideration is requested.

When read in context, the monitoring disclosed in paragraph [0022] of the Ukon et al. publication is simply for displaying the monitored conditions on line and/or for storing and processing plasma image data in the memory of a computer unit along with measured data. Paragraph [0022] of the Ukon et al. publication discloses that the processing of plasma image data may comprise obtaining intensity images, intensity contour, color contour, intensity outline, and time base fluctuation of image data. While paragraphs [0014] – [0016] of the Ukon et al. publication disclose various purposes of the present invention, including control, the Ukon et al. publication does not disclose a control section shutting down the plasma torch when the plasma changes to a toroidal plasma shape. Rather, paragraph [0025] of the Ukon et al. publication discloses that the purpose of acquiring the status of a plasma is to enable an operator to immediately determine whether or not the plasma is in requisite condition for normal analysis or later on to set up optimal plasma conditions. However, there is no processing of the plasma image data disclosed in the Ukon et al. publication for the purpose of effecting control of the plasma device, especially shutting down the torch if an abnormal plasma image is detected. To this end, there is no disclosure in Figs. 1 and 2 and the corresponding description of the Ukon et al. publication of any feedback control of plasma device 1 by computer unit 9. Absent such feedback control, computer unit 9 cannot effect control of plasma device 1 in the manner claimed in claim 1. Hence, the Farrell et al. patent and the Ukon et al. publication, either individually or

in combination, cannot anticipate or render obvious claims 1 and 14, or claims 2-13 and 15 dependent therefrom.

The Krupa et al. and Shiller patents do not cure the foregoing deficiencies in the teachings of the Farrell et al. patent and the Ukon et al. publication.

Amended claim 2 depends from claim 1 and includes the further limitation that the detector comprises an optical detector which is directed at a position at which the top region or tail of the plasma will exist, so that when the plasma collapses into the toroidal plasma, the light intensity falling on the optical detector falls, thereby changing the signal produced by the optical detector so that the control section can determine that the plasma has collapsed.

New claim 15 depends from claim 14 and includes the further limitation that the detector is directed at the top region or tail of the plasma. The plasma is monitored with the detector for a fall in light intensity due to the plasma collapsing into the toroidal plasma. The control section determines that the plasma has collapsed from a change in the signal produced by the detector due to the fall in light intensity. The detector comprises an optical detector.

Support for "the tail" in claims 2 and 15 can be found in Fig. 1 of the application as originally filed which discloses diode 70 focused on a region P in Fig. 1 at the upper portion (or tail) of the plasma shape 50.

Paragraph [0010] of the Ukon et al. publication discloses that the plasma position with regard to the spectrometer entrance slit influences the performance of the analysis and that prior to the invention disclosed in the Ukon et al. publication there was no existing means for determining the spectrometer entrance slit position with regard to the plasma position. To overcome this problem, the Ukon et al. publication discloses the use of a detector device 2 including an entrance slit 3 and a detector 4 in combination with a video-camera 7 positioned so that the lens of the camera is aligned with the optical axis of the spectrometer detector device 2, with the plasma at the focal point of the video-camera 7. With this configuration, the video-camera is able to image both the plasma and the entrance slit of the spectrometer detector device 2. This spectrometer enables image data to be acquired from both the plasma and from the entrance slit 3 of the detector device 2 of the spectrometer (see Ukon et al. paragraph [0046]).

The Ukon et al. publication, however, does not disclose or suggest the use of an optical detector directed at a position at the top region or tail of a plasma, whereupon when the plasma collapses into a toroidal plasma, the light intensity falling on the optical detector falls, whereupon the signal produced by the optical detector changes so that the control section can determine that the plasma has collapsed.

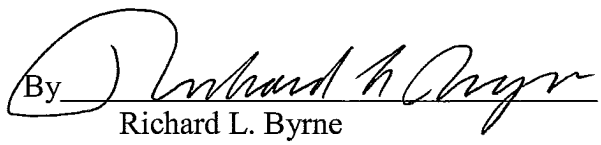
The Farrell et al., Krupa et al., and Shiller patents, either individually or in combination, do not cure the foregoing deficiencies in the teachings of the Ukon et al. publication. To this end, the prior art cited against claim 2, either alone or in combination, fails to recognize that it is advantageous to direct a detector at the top region or tail of the plasma, let alone providing a technical teaching that exploits that advantage. The top region or tail of the plasma essentially disappears when the plasma collapses into a toroidal plasma. Hence, the top region or tail of the plasma represents a region of the original plasma that, if suitably monitored, exhibits a particularly precipitous change in light intensity.

Absent disclosing all the limitations of claims 2 and 15, the Ukon et al. publication and the Farrell et al., Krupa et al., and Shiller patents, either individually or in combination, cannot anticipate or render obvious claims 2 and 15, or claim 13 dependent from claim 2.

Based on the foregoing amendments and remarks, reconsideration of the rejections and allowance of claims 1-15 are requested.

Respectfully submitted,

THE WEBB LAW FIRM

By 

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